Below is a list of things to test with queries including SQL queries to run for each of the different database designs we have.

Database designs:

* Simple: One table where each row has the counts for each category (many columns)
* Separated Occurrences: Each image has a separate entry in the table for each category it’s a part of
* Normalized Version: Each category has a separate table

# Simple test: searching based on presence of one category

SQL for Simple table:

select \* from data where airplane>=1

SQL for Separated Occurrences:

select \* from occurences where category\_name='airplane' and occurences>=1

# Searching for a specific number of occurrences for a particular category

SQL for Simple table:

select \* from data where airplane=3

SQL for Separated Occurrences:

select \* from occurences where category\_name='airplane' and occurences=3

# Searching for presence of two specific categories

SQL for Simple table:

select \* from data where airplane>=1 and person>=1

SQL for Separated Occurrences:

select \* from occurences where image\_id in (

select image\_id from occurences where category\_name='airplane' and occurences>=1

INTERSECT

select image\_id from occurences where category\_name='person' and occurences>=1)

# Searching for presence of two specific categories that have a smaller pool of results

SQL for Simple table:

select \* from data where airplane>=1 and bird>=1

SQL for Separated Occurrences:

select \* from occurences where image\_id in (

select image\_id from occurences where category\_name='airplane' and occurences>=1

INTERSECT

select image\_id from occurences where category\_name='bird' and occurences>=1)

# Searching for presence of multiple specific categories

SQL for Simple table:

select \* from data where airplane>=1 and snow>=1 and sand>=1 and net>=1 and cup>=1

SQL for Separated Occurrences:

select \* from occurences where image\_id in (

select image\_id from occurences where category\_name='airplane' and occurences>=1

INTERSECT

select image\_id from occurences where category\_name='snow' and occurences>=1

INTERSECT

select image\_id from occurences where category\_name='sand' and occurences>=1

INTERSECT

select image\_id from occurences where category\_name='net' and occurences>=1

INTERSECT

select image\_id from occurences where category\_name='cup' and occurences>=1)

# Difference of AND and OR: Searching for presence of one specific category OR another

SQL for Simple table:

select \* from data where airplane>=1 or person>=1

SQL for Separated Occurrences:

select \* from occurences where image\_id in (

select image\_id from occurences where category\_name='airplane' and occurences>=1

UNION

select image\_id from occurences where category\_name='person' and occurences>=1)

# Difference of AND and OR: Searching for presence of one specific category OR another when the pool of results is smaller

SQL for Simple table:

select \* from data where airplane>=1 or bird>=1

SQL for Separated Occurrences:

select \* from occurences where image\_id in (

select image\_id from occurences where category\_name='airplane' and occurences>=1

UNION

select image\_id from occurences where category\_name='bird' and occurences>=1)

# Difference of AND and OR: Searching for presence of any of multiple specific categories

SQL for Simple table:

select \* from data where airplane>=1 or snow>=1 or sand>=1 or net>=1 or cup>=1

SQL for Separated Occurrences:

select \* from occurences where image\_id in (

select image\_id from occurences where category\_name='airplane' and occurences>=1

UNION

select image\_id from occurences where category\_name='snow' and occurences>=1

UNION

select image\_id from occurences where category\_name='sand' and occurences>=1

UNION

select image\_id from occurences where category\_name='net' and occurences>=1

UNION

select image\_id from occurences where category\_name='cup' and occurences>=1)